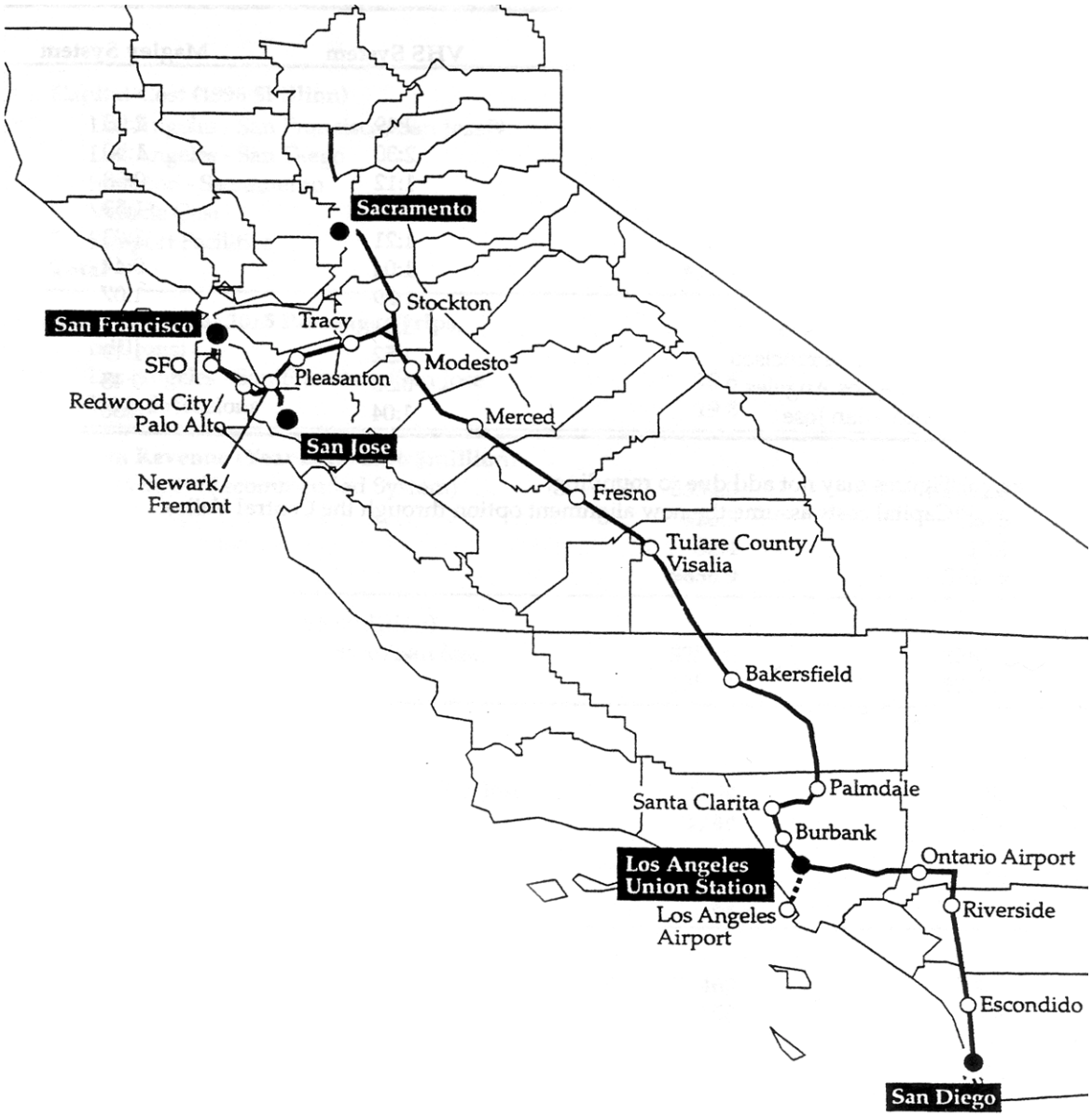
Figure 3.1-4
IHSR Commission Recommended System



Source: Final Report, High-Speed Rail Summary Report and Action Plan, December 1996

areas were demographic growth potential, accessibility and station spacing and specifically included:

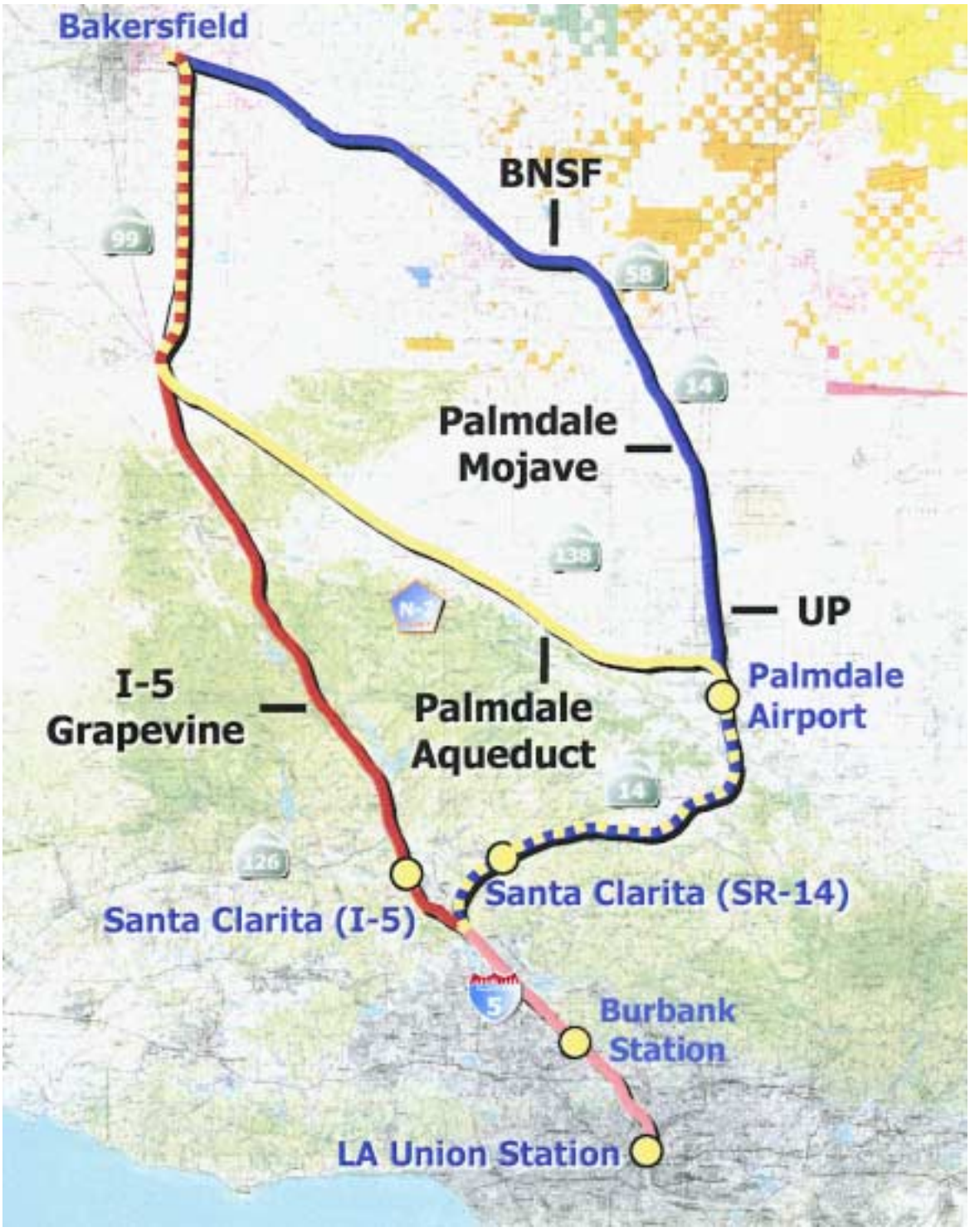
- Proximity to key population and employment centers
- Proximity to high growth areas and/or major tourism/recreational areas
- Potential to serve key travel markets and/or city pairs
- Accessibility by auto
- Intermodal interface potential
- Station spacing

With these factors in mind the IHSR Commission identified the following station service areas in the Los Angeles-to-Bakersfield region: Los Angeles Union Station, Burbank Airport, Santa Clarita and the Palmdale Airport. The Burbank Airport station had two alternative locations, one at the airport at Hollywood Way and San Fernando Boulevard and one in downtown Burbank at the North Front Street and Olive Street Metrolink station. The Santa Clarita station also had two options, one on the I-5 alignment at Valencia Boulevard and one along I-14 at Via Princessa and Sierra Highway. The Palmdale Airport/Antelope Valley station site was on Avenue P-8 and east of Sierra Highway. All of these station service areas are still under consideration, although some of the precise sites have changed.

3.1.4 Alignments Previously Reviewed by the California High-Speed Rail Authority

In 1998, the California High-Speed Rail Authority took up where the IHSR Commission left off and continued to assess and evaluate the viability of various corridors throughout the State for implementation as part of a statewide high-speed rail system. The corridors were evaluated on the basis of capital, operating and maintenance costs, travel times and engineering, operational and environmental constraints.

From Los Angeles Union Station to the I-5/SR-14 junction at Sylmar the alignments all follow the existing Metrolink/UPRR corridor and include a potential station at Burbank Airport. The Antelope Valley/Mojave Pass alignment follows the SR-14 corridor turning to the east in Soledad Canyon and then generally following the Metrolink/UPRR corridor into Palmdale. Then it follows the UPRR and Sierra Highway through the Antelope Valley to Mojave, following the SR-58 and BNSF rail corridor through the Tehachapi Mountains into the Central Valley to Bakersfield. This is the alignment recommended by the IHSR Commission. Alternatives to this alignment are the Aqueduct Pass, which turns to the west north of the Palmdale Airport Station and crosses the Antelope Valley to follow the Aqueduct corridor before crossing the Tehachapi Mountains, and the I-5/Grapevine alignment, generally following the freeway corridor (see Figure 3.1-5). All of these options were previously evaluated by the IHSR Commission and are included in the current analysis for the Program EIR/Tier 1 EIS. Similarly, all the station service areas identified by the IHSR Commission for the Los Angeles-to-Bakersfield region were included in the prior CHSRA study and will continue to be addressed in the Program EIR/Tier 1 EIS.



Source: Draft Final Report – California High-Speed Rail Corridor Evaluation, December 1999

Figure 3.1-5 CHSRA Tehachapi Crossing Alternatives

3.2 CONFIRMATION OF REASONS OPTIONS SCREENED FROM FURTHER ANALYSIS

The site along the Los Angeles River north of SR-101 is occupied by an MTA bus yard and is abutted by the County jail and police facilities presenting major difficulties for pedestrian connections to transit and other rail modes. There may be fewer land use conflicts south of SR-101 and north of First Street.

A summary of all of the alignments and station locations that have been evaluated for high-speed rail in the Los Angeles-to-Bakersfield region is presented in the following table. The table includes all alternatives reviewed by Caltrans, the IHSR Commission and the prior CHSR Authority study.

Table 1. Alignments and Station Locations Evaluated for High-Speed Rail in the Los Angeles-to-Bakersfield Region

Alignments/Segments	Comments	Retained/Rejected
Los Angeles-to-Sylmar via Metrolink/UPRR	Most viable option in congested urban area. Abuts extensive development. Traverses Burbank Airport Clear Zone. Recommended in all prior studies.	**Retained**
Los Angeles-to-Sylmar via I-5	Curvature does not allow for high operating speeds. Limited Freeway right-of-way and tight curves likely to require acquisition of adjacent property.	**Retained**
I-5 "Grapevine" Freeway Corridor (North of I-5/SR-14 Split)	The I-5 Freeway Corridor was recommended by prior studies. Minimizes environmental effects by closely paralleling the existing free-way corridor.	**Retained**
I-5 "Grapevine" Corridor Variants in Trough Canyon and Cienaga Canyon and west of the "Grapevine."	Segments east of existing I-5 were rejected due to length, tunneling requirements and environmental impacts. Segments to west were rejected due to severe soils constraints.	Rejected
I-5 "Grapevine Corridor Variant via Commanche Point	Crosses similar terrain as I-5 Freeway Corridor. Offers potentially better access into Bakersfield along utility corridors. Crosses undeveloped area with potentially more environmental impacts.	**Retained**
UPRR/Metrolink through Soledad Canyon	Rugged terrain, flatter grade than SR-14, requires some tunneling, some environmental impacts.	**Retained**
SR-14 from I-5 Junction to Antelope Valley	Steeper grade, conflicts with proposed highway improvements, more impact to developed areas.	**Retained**
UPRR through Antelope Valley	Wide, flat existing right-of-way, opportunities for station locations, populated area	**Retained**
California Aqueduct through Antelope Valley	Parallels San Andreas Fault Zone and abuts residential development and habitat preserve.	**Retained**
SR-138 through Antelope Valley (variant of California Aqueduct)	Flat, straight east-west crossing of Antelope Valley that avoids development. Tunnel with steep grade through Tehachapis.	**Retained**
SR-58/BNSF through Tehachapi Mountains	Tunnel and steep grade at top of crossing.	**Retained**
SR-58 Variant	Provides a less steep grade, with a longer tunnel. Better operationally. Land use concerns along SR-58.	**Retained**

Stations	Comments	Retained/Rejected
Antelope Valley at Lancaster Metrolink Station	Existing Metrolink station. Located in existing commercial/ an industrial area.	**Retained**
Antelope Valley at Palmdale Transit Center	Provides intermodal connections to bus, rail and airport. Connections with two major high-ways: SR-14 and SR-138	**Retained**
Antelope Valley at former Palmdale Metrolink stop	Urbanized area. Discontinued temporary Metrolink stop. Palm-dale Transit Center site preferred by City.	**Retained**
Santa Clarita at I-5/SR-126/Magic Mountain Pkwy.	Provides access to proposed tech center and Magic Mountain.	**Retained**
Santa Clarita at I-5/Calgrove Blvd./The Old Road	Rugged terrain.	**Retained**
Santa Clarita at SR-14/San Fernando Rd.	Rugged terrain. Existing Park & Ride site.	**Retained**
Santa Clarita at SR-14/Via Princessa	Substantial recent and ongoing development at this interchange.	**Retained**
Sylmar north site	Access from three freeways. Opportunity for Metrolink connection. In industrial area.	**Retained**
Sylmar at existing Metrolink station.	Densely developed area with potential impact to surrounding land use and road network. Existing Metrolink connection.	**Retained**
Burbank Airport	Airport Clear Zone crosses the alignment north of the site. Tracks should be depressed. Needs bus/shuttle connection to Metrolink Ventura route.	**Retained**
Burbank downtown	Densely developed area with potential impact to surrounding land use and road network. Existing Metrolink connection.	**Retained**
Los Angeles Union Station	Very congested site. Best intermodal access.	**Retained**
Terminal Annex	Site now being develop-ed as an infomart project.	Rejected
Los Angeles River	Poor intermodal and pedestrian connection opportunities. Northerly location impacts MTA bus yard. Southerly location requires river crossing for pedestrian access to other transit and rail modes.	**Retained**
South of SR-101/1st Street	May affect DWP facility. Track configuration may affect proposed development and Artists District. Needs pedestrian connections to other transit and rail modes. Traffic/access concerns.	**Retained**
Cornfield Property	Currently being purchased for park development by the Environ-mental Defense Fund in cooperation with the Chinatown Yard Alliance.	**Retained**

3.3 ADDITIONAL ALIGNMENT AND STATION OPTIONS STUDIED

Concerns arose because the Aqueduct alignment parallels the San Andreas Fault for a distance of more than thirty miles. A new SR-138 alignment was proposed as a variant to the Aqueduct alignment because it is straight, gently sloping, with large radius curves (allowing for high operating speeds) and traverses an area with little development. This alignment would generally follow SR-138 across the Antelope Valley, in an east-west direction, from a mountain crossing at the west edge of the valley near the California Aqueduct. It would then join the UP corridor

running through Lancaster and Palmdale. The Aqueduct and SR-138 alignments are shown on Figure 3.0-1.

Since the completion of prior studies, rapid growth has continued adjacent to freeways in the Santa Clarita area, recent and proposed development projects now conflict with previously identified station sites. In addition, other areas have been recommended as County of Los Angeles Significant Ecological Areas. At the Burbank Airport a new terminal is planned for the northeast quadrant of the intersecting runways, and the Burbank Metrolink site is small and confined to a strip between the I-5 freeway and a flood control channel and industrial area. Due to these development conflicts for station siting in Santa Clarita and Burbank, a new station location was identified for Sylmar. This location is a focal point of Los Angeles Basin freeways, converging at the base of the I-5 and SR-14 mountain passes. Two potential station options were identified for Sylmar, one at Roxford Street in an industrial/commercial area and one at the existing Metrolink Station.

4.0 ALIGNMENT AND STATION EVALUATION

This section of the report describes the findings of the screening analysis and scores the various alignment segments and potential station locations for the various engineering, operational, constructibility and environmental factors evaluated. A narrative discussion is provided on the results of the analysis for each of the key parameter and the results are also summarized in two matrices, one focusing a comparison of the alignments and the other comparing the station locations.

4.1 ALTERNATIVE ALIGNMENT AND STATION OPTION COMPARISON

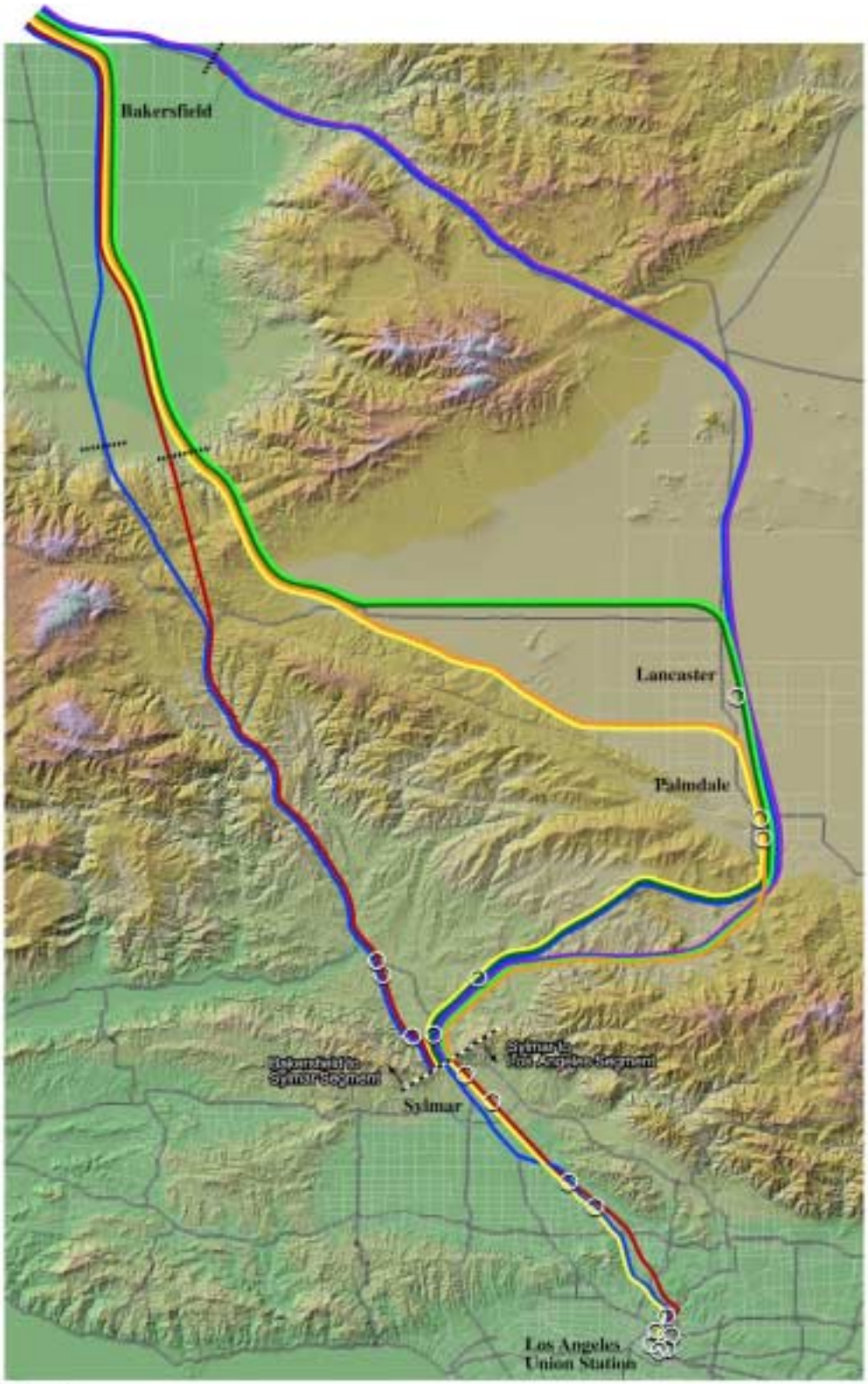
For analysis purposes, the Bakersfield-to-Los Angeles region has been divided into two segments; in addition, the possible approaches to the Los Angeles Union Station area were also examined as a third set of segments. The three sets of segment options are: Bakersfield-to-Sylmar, Sylmar-to-Los Angeles and Los Angeles Union Station approaches from San Diego (Figure 4.1-1). The run from Bakersfield-to-Sylmar includes eight total alignments along I-5, SR-58 (through Mojave), along the new SR-138 alignments and along the California Aqueduct (Figure 4.1-2). The I-5 alignments have two options. The latter three options through Antelope Valley also have variants along SR-14 or through Soledad Canyon. Three station location options are considered in Antelope Valley and five in Santa Clarita. Three of the Santa Clarita station locations are along the I-5 corridor and two are along the Antelope Valley alignments.

It should be noted that the Bakersfield-to-Los Angeles corridor studies terminate at the base of the north face of the Tehachapis where a variety of alternative alignments are being studied in the Sacramento-to-Bakersfield corridor study for connection to the various Bakersfield station alternatives. Three of these alignments have been assumed to provide data on travel times, costs, engineering and environmental factors for evaluation of the Bakersfield-to-Sylmar alignments. These connections assume a Bakersfield station located at the Golden State site (designated as station site S72 in the Sacramento-to-Bakersfield corridor study).

South of Sylmar, the Sylmar-to-Los Angeles segment includes three alignments (Figure 4.1-3), one in the Metrolink/UPRR right-of-way, one generally following the I-5 corridor and one that is a hybrid of the first two. The hybrid uses the rail right-of-way on the northerly end and generally follows the I-5 corridor south of downtown Burbank, with a tunnel under Elysian Park for a faster approach into the Union Station area. The Sylmar-to-Los Angeles segment includes two proposed station options at Sylmar, two at Burbank and six in the Union Station area. The Sylmar station location was added to the study due to its location at the convergence of five major freeways (I-5, SR-14, I-210, I-405 and SR-118 and the close proximity of a sixth (SR-170) providing excellent feeder routes for station access. It is also under consideration due to the increasing development pressures at several of the Santa Clarita station sites and environmental conflicts at several others.

Similarly the two Burbank sites also face development constraints. The Sylmar locations are under consideration to determine if Sylmar would be a reasonable replacement for the Santa Clarita and/or Burbank stations.

The final set of segments studied is the alternative approaches to Union Station from the LOSSAN and Inland Empire corridors. These alternatives, shown in Figures 4.1-4 and 4.1-5 depicting the Union Station options, include the various rail and freeway rights-of way that could provide access to the various station options under study. Not all routes can access all station options. Freeway corridor routes are the SR-60, I-10, I-5 and SR-101; rail corridor approaches are the UPRR's El Monte/Colton and Whittier Junction lines and the BNSF's Hobart and Harbor Division lines.



High-Speed Train Alignments and Stations for the Bakersfield-to-Los Angeles Corridor

Figure 4.1-1

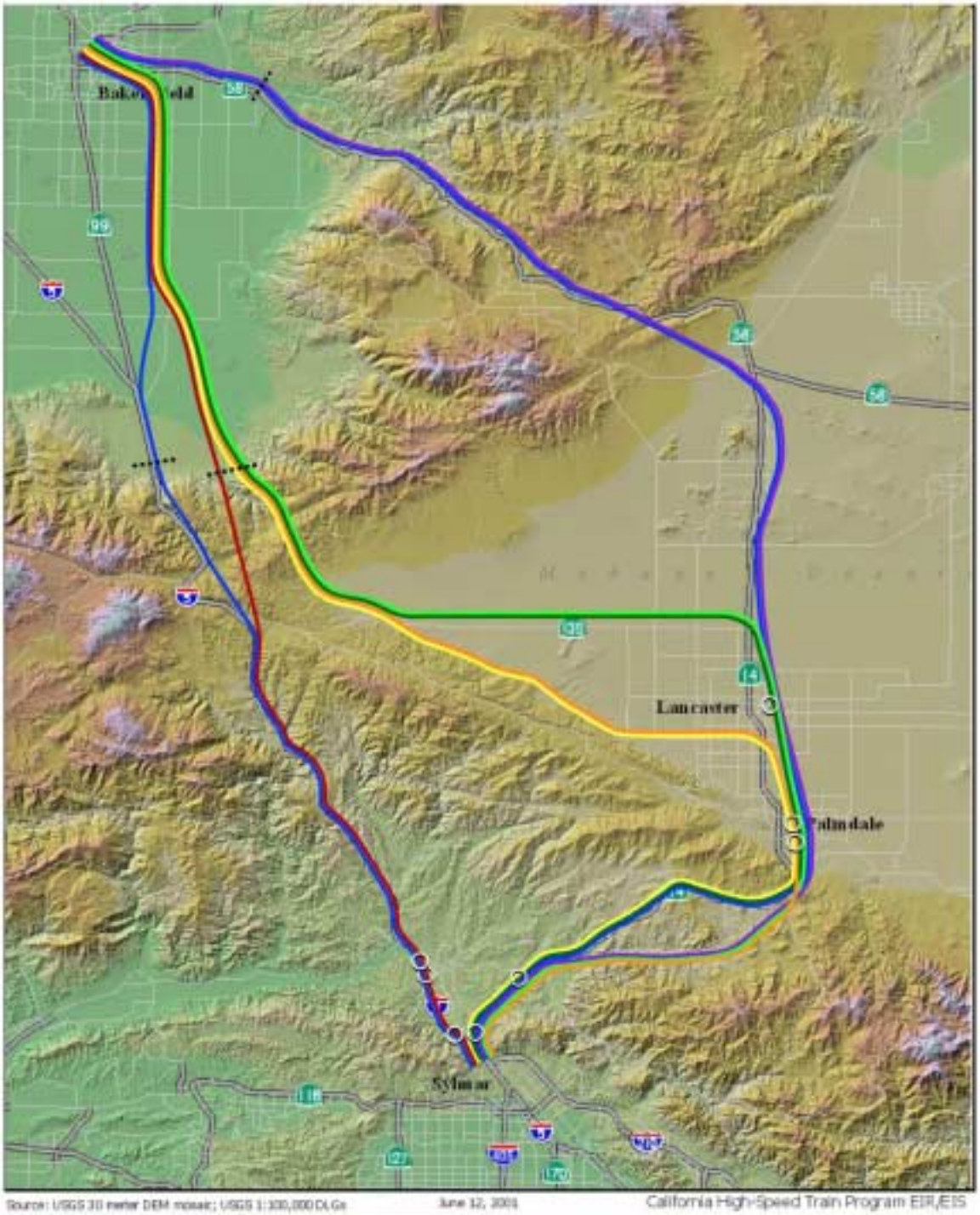
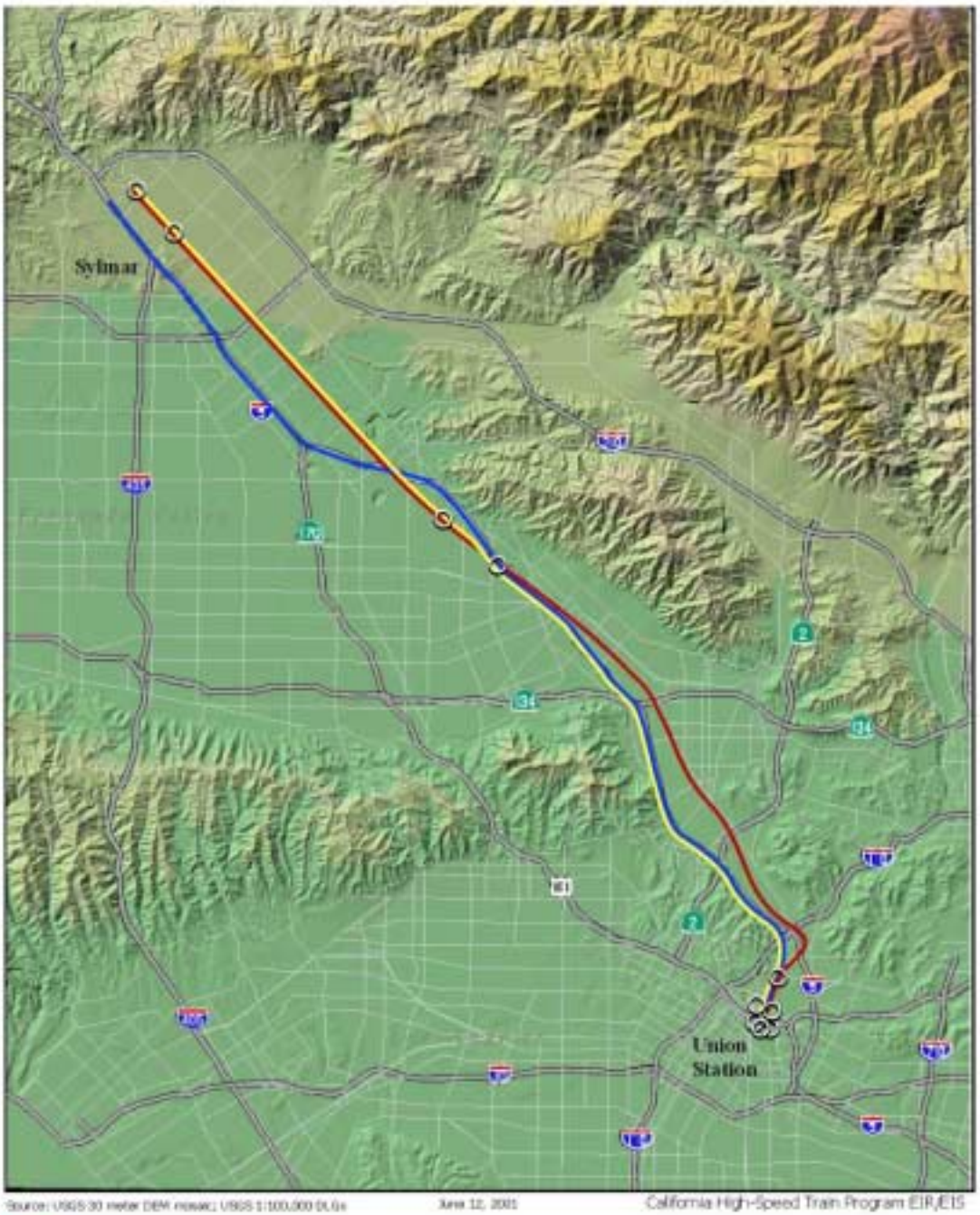

Lancaster
Palmdale
Sylmar
Source: USGS 30 meter DEM mosaic; USGS 1:100,000 DLGs
June 12, 2001
California High-Speed Train Program EIR/EIS
Legend
Option 1
Option 1A
Option 2
Option 2A
Option 3
Option 3A
Option 4
Option 4A
Region Study Limit
Station Options
5 0 5 Miles
5 0 5 Kilometers
Bakersfield-to-Sylmar
Alignment Options

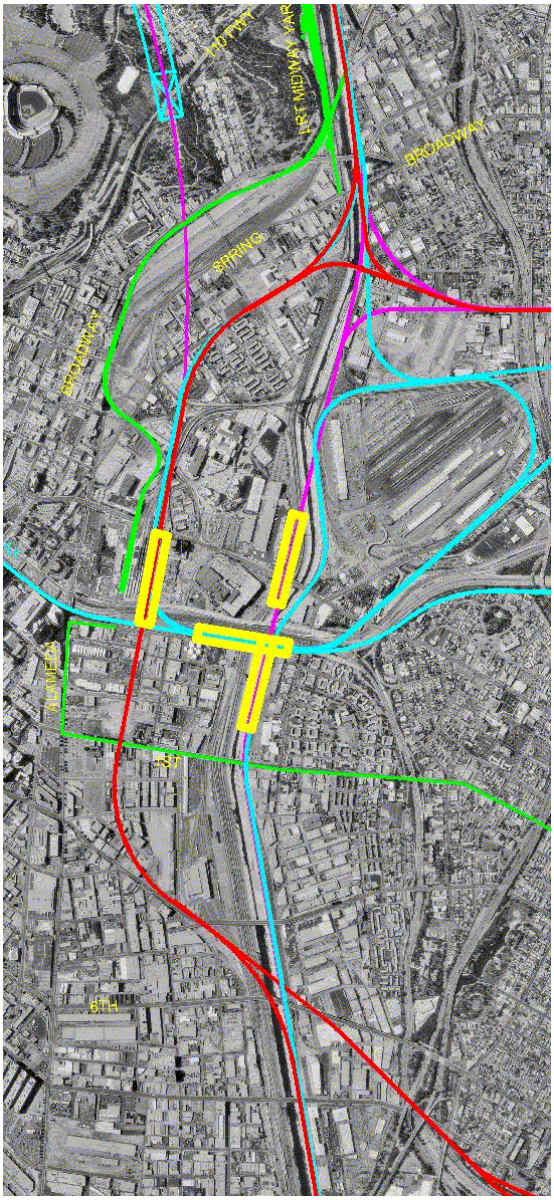
Figure 4.1-2



Sylmar-to-Union Station Alignment Options

Figure 4.1-3

Figure 4.1-4 Union Station Options 1,2, 4 and 5, Existing Station South (Through), Los Angeles River West and Los Angeles River East.



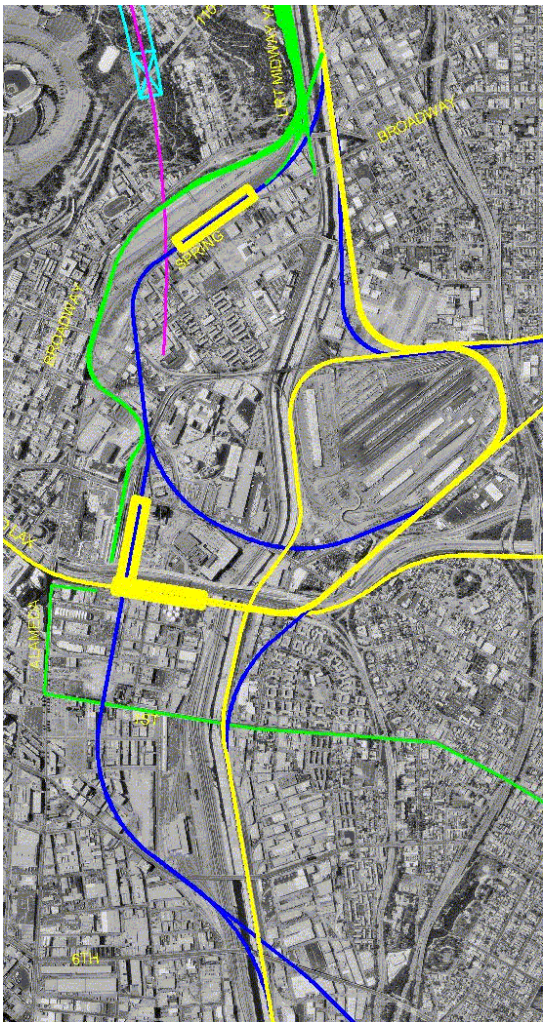


Figure 4.1-5 Union Station Options 1,3, and 6, Existing Union Station, Union Station South (Stub) and Cornfield.

4.1.1 Bakersfield-to-Sylmar Segment

A total of eight alignment options were evaluated between Bakersfield and Sylmar. All alignment options for this segment would connect to the Sacramento-to-Bakersfield Corridor in Bakersfield. The Bakersfield-to-Sylmar segment alignment options are designated as follows:

I-5 Alignments:
*Alignment Option 1 – Interstate 5 (I-5) Alignmen*t: This alignment would extend east along the Union Pacific Railroad (UPRR) from a Bakersfield station, south along State Route 184 (SR-184)/Wheeler Ridge Road, and generally follow I-5 over the Tehachapi Mountains through Santa Clarita to Sylmar. Station locations considered along this route include Santa Clarita only. Within Santa Clarita there are three station location options: (1) State Route 126 (SR-126)/I-5, (2) Magic Mountain Parkway/I-5 and (3) The Old Road/I-5. (The Sylmar station location options at Roxford Street and Sylmar Metrolink Station are included in the Sylmar-to-Los Angeles, not the Bakersfield-to-Sylmar segment.)

Alignment Option 1A – I-5 Alignment via Comanche Point: This alignment would extend east along the UPRR from a Bakersfield station, south along SR-184, then south-southeast to Comanche Point along an existing power easement, tunneling from Comanche point to the I-5 alignment, then generally following I-5 to Santa Clarita and Sylmar along the same route as Option 1. Station locations are the same as for Option 1.

State Route 58 (SR-58) Alignments:
Alignment Option 2 – Soledad Canyon/SR-58: Following SR-58 east from Bakersfield, generally following SR-58 through the Tehachapis to Mojave, along UPRR through Antelope Valley, through Soledad Canyon and generally following State Route 14 (SR-14) from Santa Clarita to Sylmar. Station locations would include Antelope Valley and Santa Clarita. In the Antelope Valley there are three station locations: (1) Lancaster Metrolink Station, (2) Palmdale Transportation Center and (3) Palmdale Boulevard. In Santa Clarita there are two station locations: (1) Via Princessa/SR-14 and (2) San Fernando Road.

Alignment Option 2A – SR-14/SR-58: Same as Option 2 but follows SR-14 instead of Soledad Canyon. Stations are located in Antelope Valley and Santa Clarita. Station locations are also the same as for Option 2.

Aqueduct Alignments:
Alignment Option 3 – Soledad Canyon/SR-138: Alignments parallel to SR-138 were developed as a variation of the prior alignment that paralleled the California Aqueduct from the Tehachapi crossing to Palmdale. This SR-138 alignment would extend east along the UPRR from a Bakersfield station, south along SR-184, then south-southeast to Comanche Point along an existing power easement. It would then tunnel under the Tehachapi Mountains near the California Aqueduct, then veer to the east along SR-138 to the UPRR, through Soledad Canyon and generally follow SR-14 from Santa Clarita to Sylmar. Station locations would include Antelope Valley and Santa Clarita. In the Antelope Valley there are three station locations: (1) Lancaster Metrolink Station, (2) Palmdale Transportation Center and (3) Palmdale Boulevard. In Santa Clarita there are two station locations: (1) Via Princessa/SR-14 and (2) San Fernando Road.

Alignment Option 3A – SR-14/SR-138: Same as Option 3 but follows SR-14 instead of Soledad Canyon. Station locations are the same as for Option 3.

Alignment Option 4 – Soledad Canyon/Aqueduct: This alignment would extend east along the UPRR from a Bakersfield station, south along SR-184, then south-southeast to Comanche Point along an existing power easement. It would then tunnel under the Tehachapi Mountains near the California Aqueduct,

generally follow the Aqueduct to SR-14, through Soledad Canyon, and then generally follow SR-14 from Santa Clarita to Sylmar. Station locations would include Antelope Valley and Santa Clarita. The station locations are the same as for Option 3, except that the alignment does not extend far enough north on the UPRR to include the Lancaster Metrolink Station site.

Alignment Option 4A – SR-14/Aqueduct: Same as Option 4 but follows SR-14 instead of Soledad Canyon. Station locations would include Antelope Valley and Santa Clarita. The station locations are the same as for Option 4.

Two of the alignments, Options 1 and 2, were evaluated for two different grade options, a 2.5 percent gradient to optimize speed, power use and maintenance costs and a 3.5 percent gradient to minimize tunneling. The profiles of these two options are shown in Figures 4.1-6 and 4.1-7.

Because the study area for these alignments ended at the base of the north slope of the Tehachapis, information from the Bakersfield-to-Los Angeles Corridor was combined with information from the Sacramento-to-Bakersfield Corridor to provide the station to station data comparison. For the purposes of analysis, three connector alignments to Bakersfield were assumed. The two I-5 alignment options would connect to an alignment that generally follows Wheeler Ridge Road and SR-184, joining the Union Pacific (former Southern Pacific) (UP) east of downtown Bakersfield. The SR-58 alignments simply follow the UP into Bakersfield. The SR-138/Aqueduct alignments follow a power easement to SR-184 and then join the UP east of Bakersfield.

The possible Antelope Valley station sites are (Figure 4.1-8 and 4.1-9):

Option 1 – Lancaster Metrolink Station: Suitable for SR-58 alignment Options 2 and 2A.
Option 2 – Palmdale Transportation Center
Option 3 – Palmdale Boulevard: Adjacent to the Palmdale Public Library and City Hall complex.

The potential Santa Clarita station sites are (Figures 4.1-10, 4.1-11, 4.1-12 and 4.1-13):

Option 1 – SR-126/I-5: Suitable for alignment Options 1 and 1A, the I-5 and I-5 via Comanche Point alignments.
Option 2 – Magic Mountain Parkway/I-5: Suitable for alignment Options 1 and 1A, the I-5 and I-5 via Comanche Point alignments.
Option 3 – The Old Road/I-5: Suitable for alignment Options 1 and 1A, the I-5 and I-5 via Comanche Point alignments.
Option 4 – Via Princessa/SR-14 /SR-14: Suitable for all alignments going through Antelope Valley.
Option 5 – San Fernando Road/SR-14: Suitable for all alignments going through Antelope Valley.

A. MAXIMIZE RIDERSHIP/REVENUE POTENTIAL

Travel Time

Alignment Evaluation/Comparison: Travel times reflect overall length of the segment, acceleration/deceleration times at Bakersfield and Los Angeles Union Station, speed losses related to grades, and schedule recovery time.

Each of the 2.5 percent maximum grade alignments considered between Bakersfield and Sylmar would allow for maximum operating speeds – 220 mph (350 kph) VHS and 240 mph (385 kph) maglev – subject to vehicle performance over sustained gradients. At

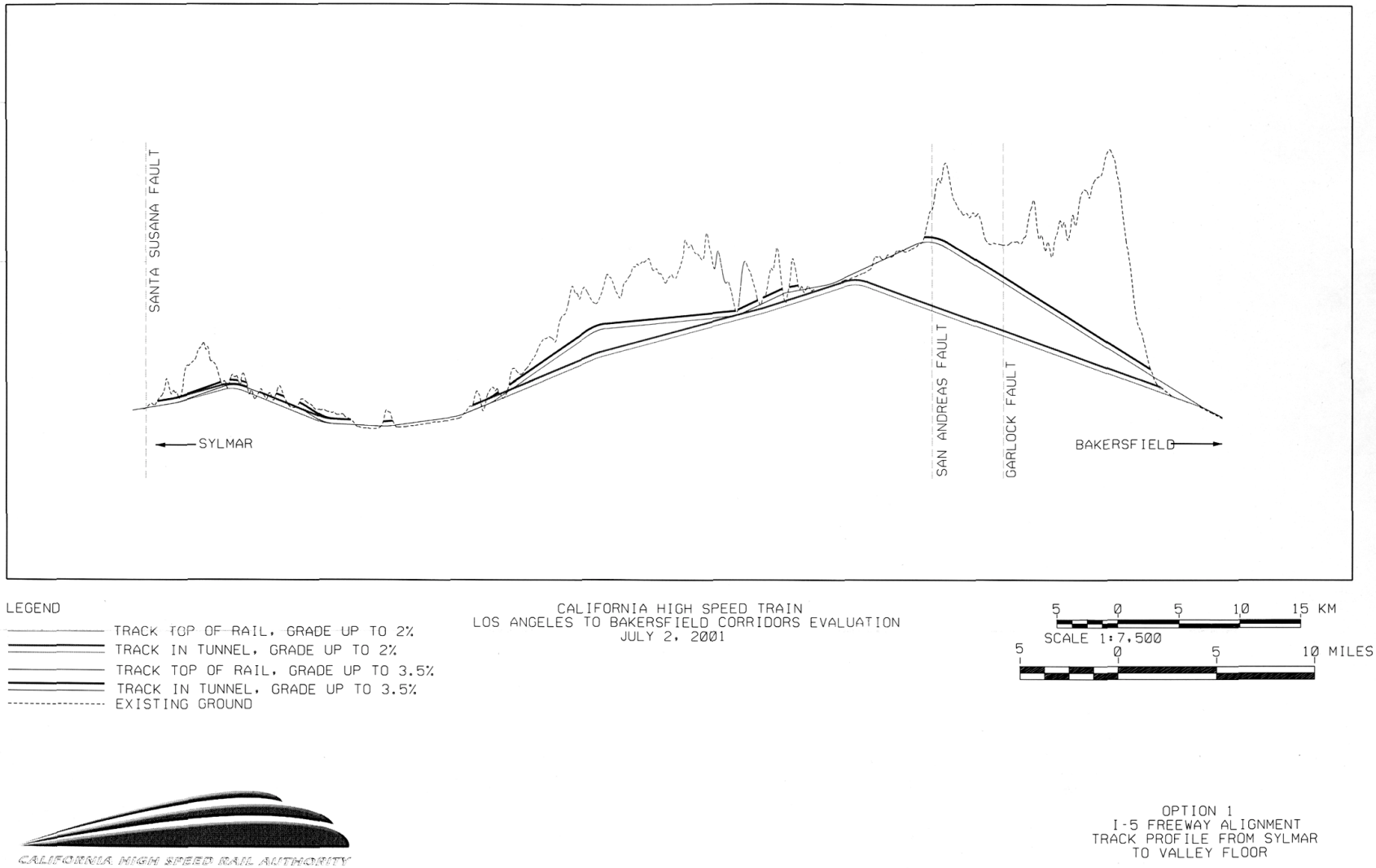


Figure 4.1-6 2.5 and 3.5 Percent Maximum Grade Variants for Bakersfield-to-Sylmar Alignment Option 1

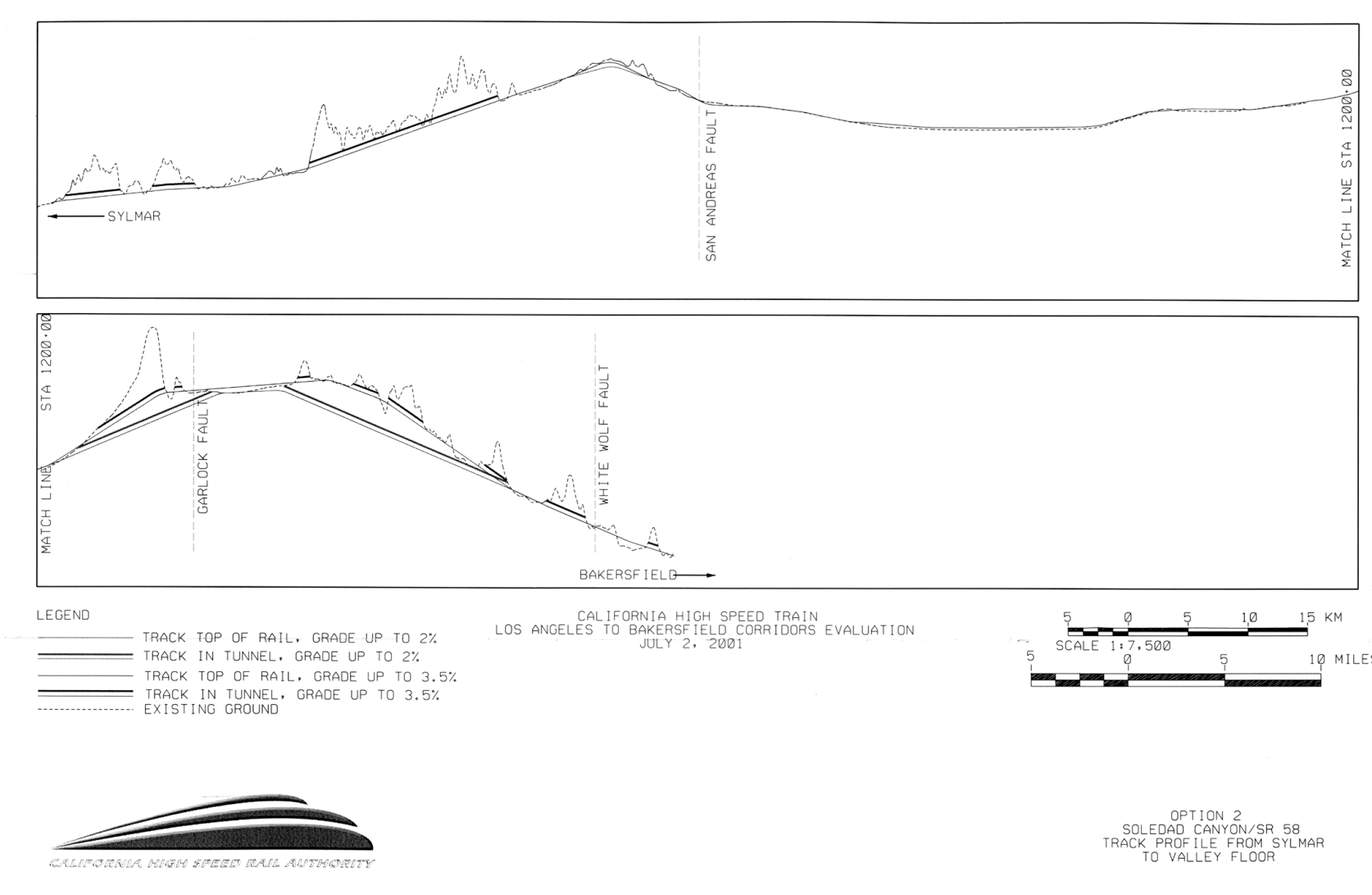


Figure 4.1-7 2.5 and 3.5 Percent Maximum Grade Variants for Bakersfield-to-Sylmar Alignment Option 2

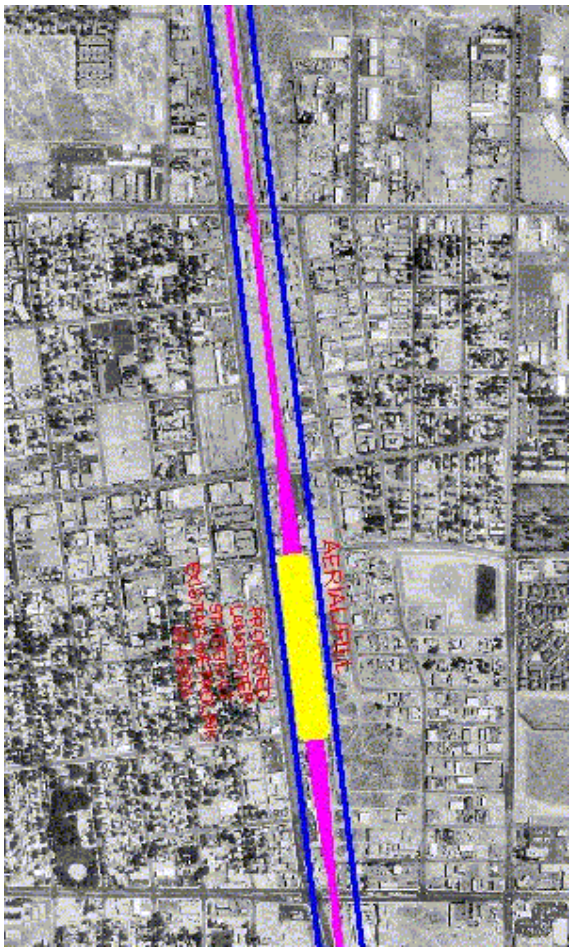


Figure 4.1-8 Antelope Valley Station Option 1, Lancaster Metrolink Station

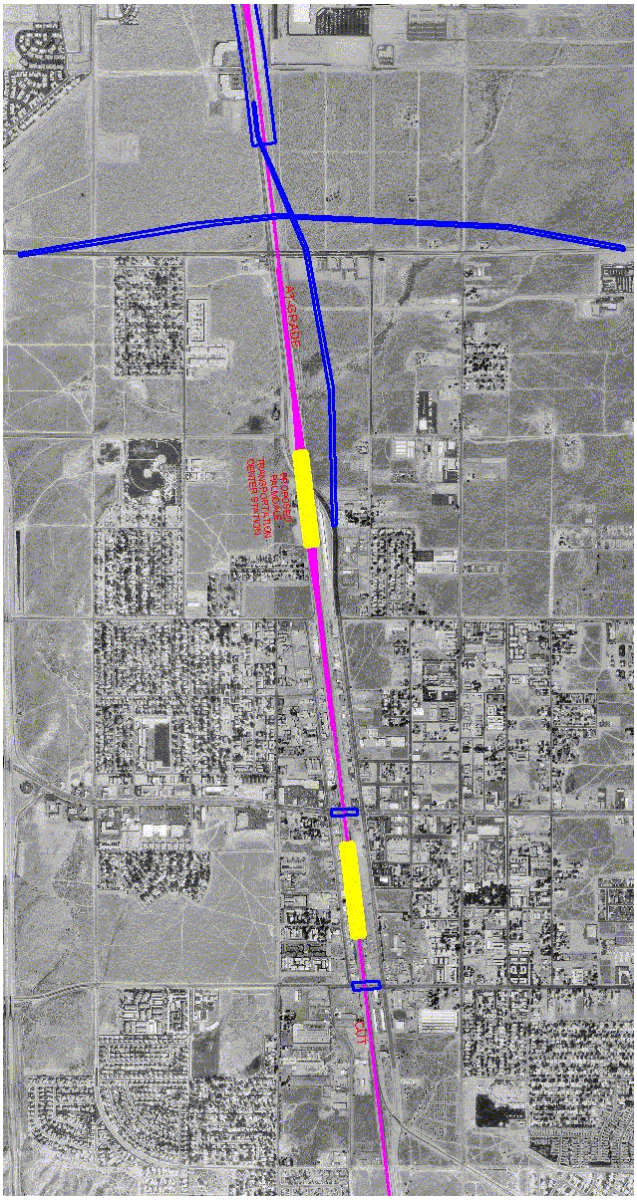


Figure 4.1-9 Antelope Valley Station Options 2 and 3, Palmdale Transportation Center (top) and Palmdale Boulevard